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**EUROPEAN PATENT APPLICATION**

Application number: **89203129.5**

Int. Cl.<sup>5</sup>: **H01B 13/00**

Date of filing: **11.12.89**

Priority: **12.12.88 NL 8803042**

Date of publication of application:  
**18.07.90 Bulletin 90/29**

Designated Contracting States:  
**AT BE CH DE ES FR GB GR IT LI LU NL SE**

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**Process and apparatus for marking of cables during laying thereof.**

Process and apparatus for marking cables during laying thereof by applying at intervals an adjustable coding in a non-destructive manner, preferably by superficially scorching the cables just enough to visualize the coding. The cable is motor driven through a pulley combination which also is connected to the marking means so that during coding the marking means is moving with substantially the same velocity as the cables.

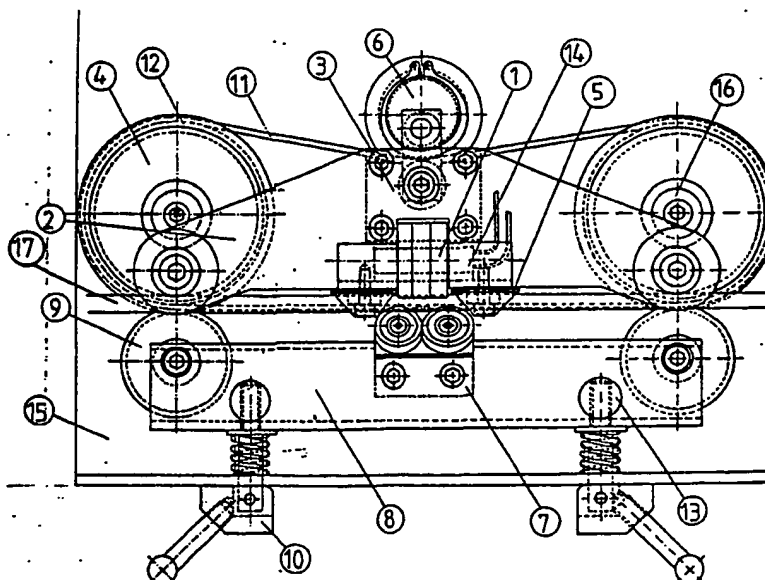


FIG. 1

## Process and apparatus for marking of cables during laying thereof

The invention relates to a process and apparatus for the marking of cables during laying thereof.

It is known to mark finished cables according to origin and quality to indicate the type of cable and the manufacturer. This however does not give a coding of the cables for a particular purpose.

When renewing or repairing cable connections often termination difficulties arise if a very large number of terminals has to be handled, such as for office buildings, apartments etc. Especially if cable terminals are disconnected by digging operations or other undesirable events it is necessary to trace the terminals of cables which correspond with each other, which is rather time-consuming and in practice can only be carried out by trial and error.

The invention is directed to a process with which one is capable when starting operation to apply an adjustable coding to the cables during laying thereof, as well as an apparatus for carrying out this process, whereby the afore mentioned problems can be overcome. Thus the operator is able to connect the cables during the operating steps in the right way without losing unnecessary time.

One of the problems which arises during marking of running cables is that the marking means is at a standstill during the moment of coding, whereby easily damage may occur. This is a consequence of the fact that the cable is carrying out a continuous movement and the marking means a periodic one.

The process according to the invention is characterized in that the cables during laying or renewing or repairing are coded lengthwise at intervals in a non-destructive manner before they finally are connected. The coding takes place in a non-destructive manner to prevent damage to the cables. Preferably the coding is applied by superficially scorching the cables just enough to visualize the coding, such as a cipher or letter or combination thereof and keep is visible. This scorching step may not in any way affect the further functioning of the cables or offer a place of attack for abrasion, corrosion etc.

The cable is motor driven by guiding rolls, wherein the coding of the cables by a marking means takes place with the same velocity as the cable is proceeding. For this purpose the cable is motor driven through a pulley combination which movement is directly coupled with a pulley mechanism that drives the marking means. In a special embodiment this coupling takes place eccentrically so that the marking means during the coding strike substantially carries out a translation movement.

The coding should be repeatable after fixed intervals in it must always be visible for the operator, irrespective of the part treated. The coding applied by this process can be adapted to any situation, for instance when laying cables for an apartment building one may adjust the coding desirable for that situation or the coding may be adapted to that which already exists for the apartment building.

The process is preferably carried out by guiding and coding the cable by means of a motor, whereby various velocities can be adapted.

The invention further provides an apparatus for carrying out the process as described with which the operator can apply the coding at the spot and adjust it without having to interrupt his activities of to lose unnecessary time. It is an advantage of the apparatus according to the invention that it can be driven and so arranged that the cable is coded during running and the coding takes place with synchronic coupled velocities of cable and apparatus, so that the problems during coding, such as non-smooth running of the cable and unnecessary destruction are avoided.

The apparatus according to the invention thus comprises in its most general form a cable guiding system and a cooperating marking means, so arranged that it carries out a regular coding movement, wherein the cable guiding system and the marking means are directly coupled with each other. The coupling preferably occurs by an endless pulley which preferably is motor driven and at the same time is driving the cable and the marking means.

In a special embodiment the pulley drive is arranged in a double way, i.e. the pulley axis is carrying both the conveyor pulley, which is directly coupled to the motor and the crank pulley, which may or may not have the same diameter as the conveyor pulley, which through belts or conveyors is coupled to the marking means.

In a preferred embodiment of the invention the marking means is eccentrically coupled to the pulley axis by means of the marking means holder so that the marking means carries out a rotatable movement. The marking means, wherein the coding means is comprised is moving with the marking means holder in such a rotating movement that cable and marking means and thus the coding means are moving in the same direction during coding. By means of this short synchronic movement of cable and coding means the difficulties as above mentioned are prevented.

Although the contact time is short and the marking means immediately is moving away from

the cable by means of its rotating movement, the contact time as well as the contact length are somewhat lengthened by a certain spring force existing in the system. In practice this appears to be sufficient for a shockfree operation without damage.

The driving system consists of an endless conveyorsystem known per se provided with guiding rolls which carry a conveyor belt. One of the axes of the rolls is motor driven. Preferably the conveyor belt is kept taut by means of a tensioning roll arranged between both rolls and along which the conveyor belt under tension must pass. The pulley axis is lengthened and carries a crank pulley which in cooperation with a tensioning roll placed underneath further guides the cable. The marking means holderplate is eccentrically fixed to the crank pulley by means of a rotatable axis. The marking means itself consists of a holder, fixed to the marking means holderplate, wherein is present the coding means that directly operates on the cable. Preferably the coding means comprises one or more rolls or wheels provided with marking means, such as letters or ciphers. It is an advantage to use a number of rolls so that one is able to apply codes with a number of digits, if desirable.

The marking means is provided with a thermal element by which the coding means may be heated. It is an advantage to arrange a temperature circuit to be able to adjust the temperature of the coding means. The temperature is then adjusted at a predetermined value after the heating is switched on, the action of the apparatus being blocked until the desired temperature has been reached. When another cable has to be coded the setting of the coding means is stepwise adjusted. Preferable an indicator is applied which indicates the position of the marking and coding means and which may be set from the outside, thus avoiding to set the coding at the place where high temperatures prevail.

The guiding system of the cable comprises at the one hand pulleys with tensioning rolls as already mentioned, which are moving the cable, and other guiding means which especially assure that the cable has a fixed guided position when the coding signs are applied. At the coding place therefore several guiding rolls may be provided which keep the cable in its position laterally as well as vertically. These guiding rolls are on the one hand connected to the marking means to guide the cable laterally and on the other hand to the tensioning beam, on which the tensioning rolls which cooperate with the pulley are fixed. One guiding roll may be arranged which assures the vertical guidance or two guiding rolls which are at angles with each other and thus enclose the cable within the space between these two guiding rolls and the

guiding rolls connected to the marking means. It is also possible to guide the cable elastically, in which case the cable guiding means is fixed to the tensioning beam by means of a spring so that vibrations etc are smoothed out by spring force.

The guiding system of the cable may further have other guiding means, like hollow tubes, through which the cable passes. The said guiding and tensioning rolls are as already mentioned mounted on a tensioning beam, which preferably is elastically by spring force fixed to a housing. In this way the tensioning beam with tensioning rolls and guiding rolls is kept pressed against the cable. The springs themselves are preferably adjustable, for instance by means of an eccentric lever outside the housing to enable adjustment of the desired spring force.

The marking means holderplate which is eccentrically fixed to the crank pulley may take any form, provided that the movement of the cable is not hindered and a stable movement remains possible. Thus the holder plate which has the shape of a yoke is symmetrically made and it may be provided with recesses or holes to reduce its weight. To further the stability the holderplate preferably is fixed with a rotatable axis to the tensioning roll of the crank pulley, which has the same rotation velocity as the holder plate.

The apparatus is so dimensioned that for a given thickness of the cable the right marking distance on the cable is reached. The distance which the cable is moving before being marked is equal to the circumference of the crank pulley, which in most cases will not amount to more than 25 cm. The main parts of the apparatus are made as modules and by exchanging them one can adapt the apparatus for coding of much thicker type of cable. The motor can be set at different velocities but in practice one velocity is maintained. Generally a cable velocity of 2,5 km per hour is suitable.

In a specific embodiment the marking roll is adjustable by means of a setting wheel which cooperates with the marking roll via an intermediary cogwheel, which setting wheel is cooperating with the cover or door of the marking means in such a way that on opening said cover or door the setting wheel is connected to the marking roll and a new setting of the existing code can be made, if necessary.

The invention will now be illustrated by means of the drawing, wherein

figure 1 is a schematic front view of an embodiment of the invention,

figure 2 is a side view thereof,

figure 3 is a side view of part of the apparatus showing the position of the conveyer pulley and the crank pulley.

figure 4 is cross-section of the cable carrying system different from the one shown in figure 2,

figure 5 is a schematic front view of the marking means with adjustable setting and

figure 6 is a side view of the marking means of figure 5 .

In figure 1 the marking means is indicated by references 1,2 and 3, which show the coding means consisting of three rolls of ciphers, the marking means holderplate and the marking means holder resp.

In the marking means the thermal element is schematically indicated by 14. the cable drive system comprises conveyor 11, which is running over conveyor pulleys ,rotatable about pulley axes 16, which conveyors are kept taut by tensioning roll 6.To the conveyor pulley 12 further a crank pulley 4 is connected, to which the marking means holder plate is rotatably fixed. Cable 17 enters at the left hand side of the drawing and is guided by tensioning rolls 9 placed in front of and after the marking means, which cooperate with the crank pulley and the conveyor pulley resp. The tensioning rolls 9 are fixed to a tensioning roll beam 8, which itself is connected to a housing 15.The tensioning roll 9 is fixed to the housing via guiding rod 13 provided with a spring. The springs are adjustable by means of the eccentric lever 10.

In figures 2 and 3 the cable guidance at the marking means is shown, which consist of guiding rolls 5 and guiding rolls 7 which are at an angle with the vertical direction and are connected to the tensioning roll beam 8.The pulley axis 16 is indicated as well as conveyor pulley 12 and crank pulley 4, for the marking means holder plate (figure 3).

In figure 4 a modification of the cable guiding means is shown wherein the guiding means 7 of cable 17 is coupled to tensioning beam 8 by means of springs 18. In figure 5 marking roll (3) rotatable in the direction of the arrow 24 can be coupled to setting roll 20 via intermediary clog wheel 21.The rotations of these parts are indicated by resp. arrows 22, 23 and 24.The positions of the door (or cover) 25 and a pivot 26 are schematically indicated.The numbers 1'-5' refer to the number codes present on the coding roll.

In figure 6 4 setting rolls 20 are illustrated-(corresponding to the number of coding rolls present)carried by axis 27. They are movable in the direction of arrow 28 to accommodate for the position of the marking means which may be slightly displaced in respect of the equilibrium position. To the axis 27 cams 30 are connected which at their underside show a bevelled face 30a.The cams when moving downwards come into contact with the axis 33 of the cogwheel 21 at which time

the coupling between the setting rolls 20 and the marking rolls is made.The intermediary wheel is fixed to the axis 35 of the marking. rolls. At the moment of stopping the marking rolls may be slightly shifted from the dead point.During downward movement of the cams 30 they come into contact with the beams 32 at the height of their bevelled faces, so that also if the marking wheels are not exactly in their rest position they are engaged and centralized. When further moving downward the cams come in contact with the axis so that now the setting rolls 20 are engaged with the marking means and it is possible to alter,if desired, the coding of the marking means, when the door is open. To the door a strip is connected at right angles.During downward movement of the door the strip presses against a cam which cooperates with a hingeable plate, which around its pivot point moves the setting wheel axis upwards out of contact with the marking means.

When the door is closed the reverse movement takes place and the setting rolls come free from the marking means.

## Claims

1. Process for the marking of cables, wherein the cables during laying or repairing or renewing are coded lengthwise in a non-destructive manner

2. Process according to claim 1, wherein the cables are coded by lengthwise non-destructive superficial scorching

3. Process according to claims 1-2, wherein the cables are driven and coded lengthwise at fixed intervals

4. Process according to claims 1-3, wherein the cable is driven by guiding rolls and the coding of the cables is carried out by a coding means that during coding is moving with substantially the same velocity as the cables are moved.

5. Process according to claim 4, wherein the driving means of the coding, means is directly coupled to the cable drive

6. Process according to claim 5, wherein the coding means is eccentrically coupled with the cable drive.

7. Apparatus for carrying out the process according to claims 1-6, comprising a cable guiding system consisting of guiding rolls and tensioning rolls, a marking means containing a heatable coding means said marking means being accommodated in a marking means holder plate which is directly connected to the drive of the cable by means of a crank mechanism.

8. Apparatus according to claim 7, wherein the cable guiding system and the marking means holder plate are eccentrically coupled.

9. Apparatus according to claims 6-8, wherein the marking means holder plate with a crank is connected to a tensioning roll of the driving system.

10. Apparatus according to claims 6-9, wherein the driving system comprises an endless conveyor pulley.

11. Apparatus according to claims 7-10, wherein the coding means is adjustable from the exterior by means of a setting roll means which engages with the coding means via an intermediary clog wheel when the cover of the apparatus is opened

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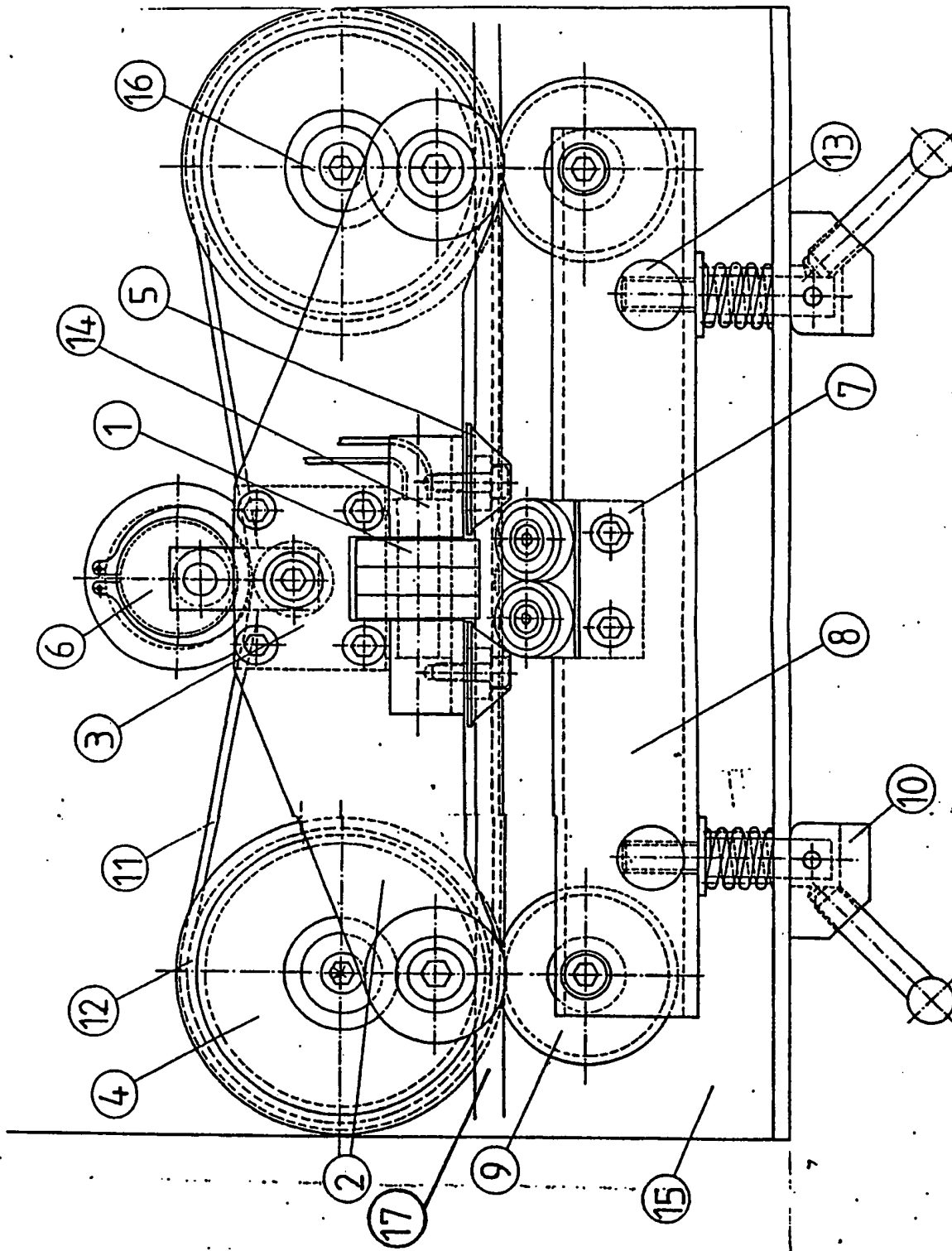


FIG. 1

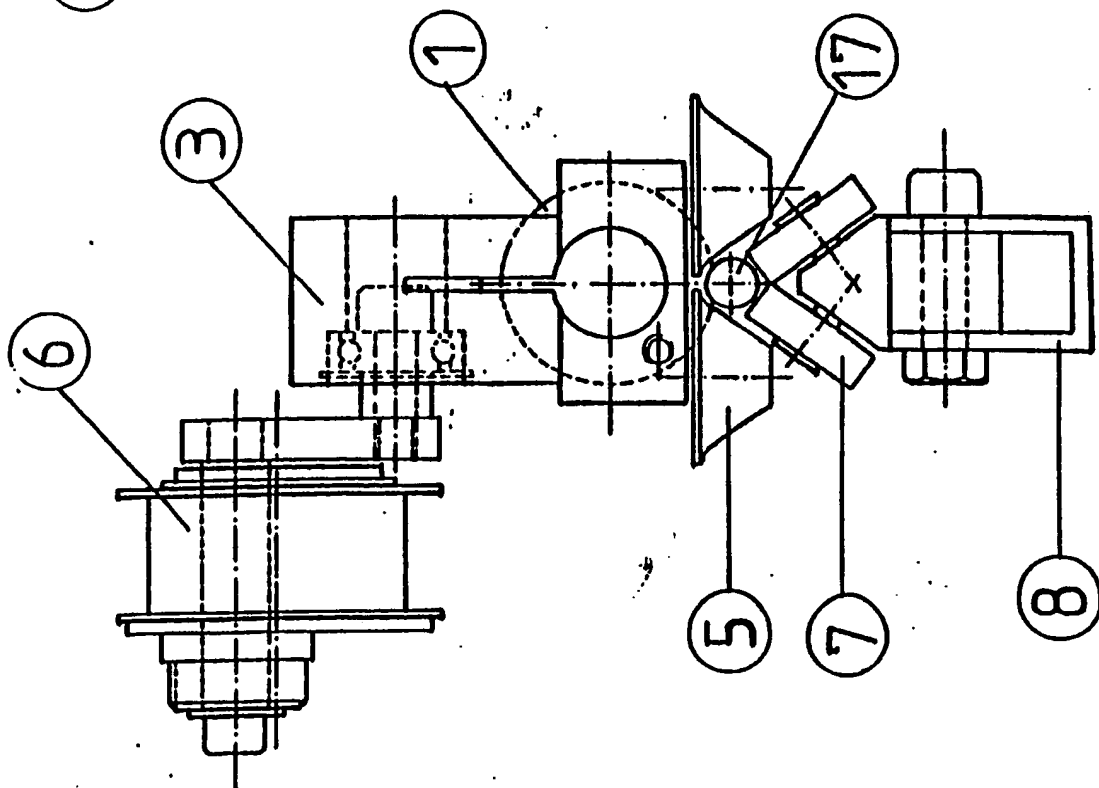


FIG. 2

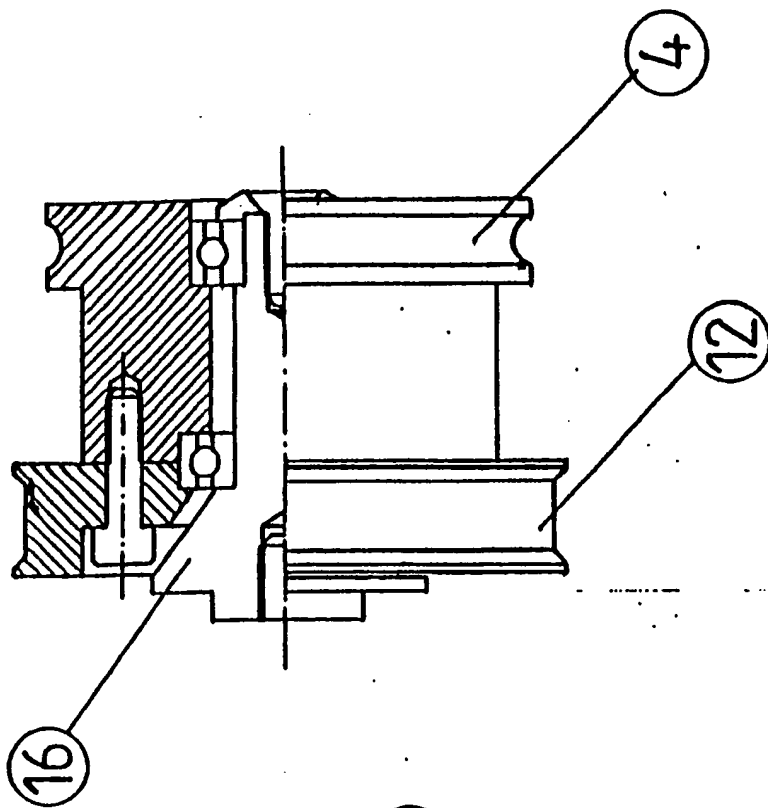


FIG. 3



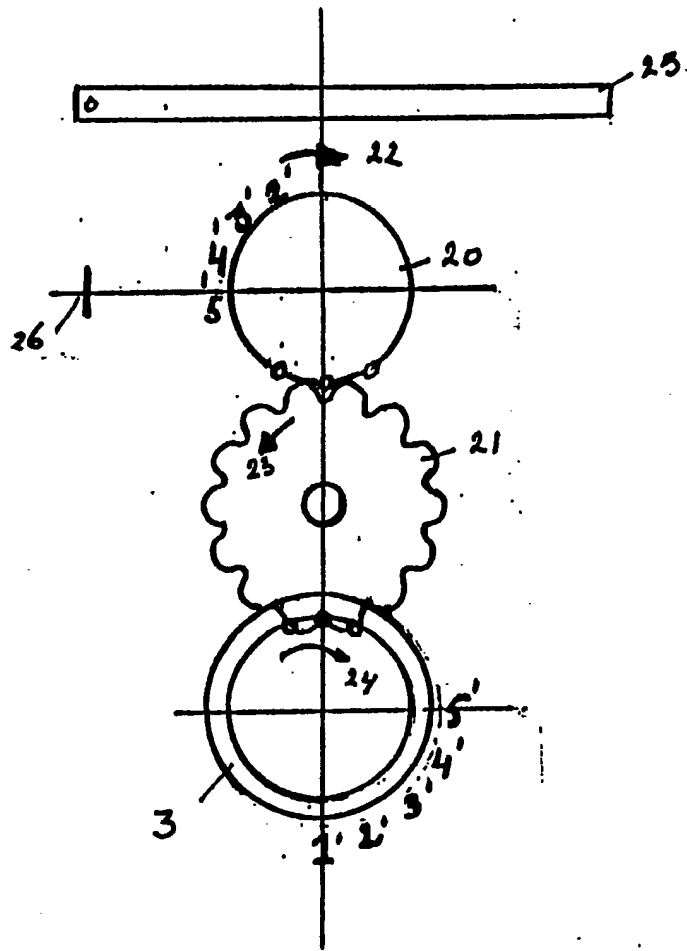


FIG 5

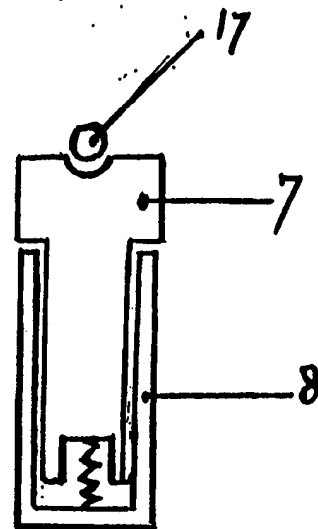


FIG. 4

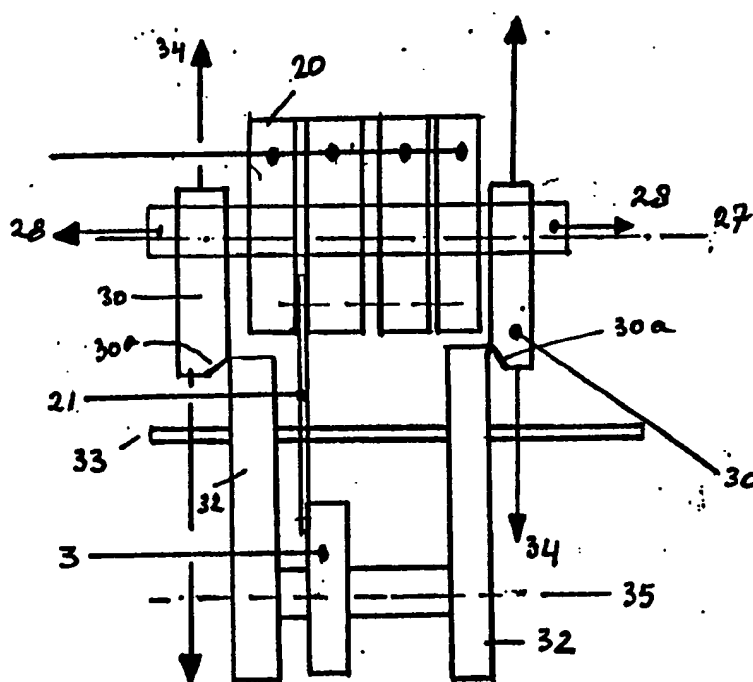


FIG. 6



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## EUROPEAN SEARCH REPORT

Application Number

EP 89 20 3129

DOCUMENTS CONSIDERED TO BE RELEVANT																	
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)														
X,A	JP-A-6 010 280 (HITACHI CABLE) * figure 1 * -----	1,2,4,7	H 01 B 13/00 H 02 G 1/06 H 02 G 1/16														
X,A	DE-A-2 939 360 (MBB) * claims 1, 4-6; figures 1-7 * -----	1,3,7															
X	FR-A-2 369 662 (SCHLUMBERGER) * claim 1; figure 2 * -----	1															
P,X,A	PATENT ABSTRACTS OF JAPAN vol. 13, no. 338 (E-795)(3686) 28 July 1989, & JP-A-1 99423 (TOSHIBA) 18 April 1989, * the whole document * -----	1,3															
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)														
			H 01 B H 02 G														
The present search report has been drawn up for all claims																	
Place of search The Hague		Date of completion of search 30 May 91	Examiner DEMOLDER J.														
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